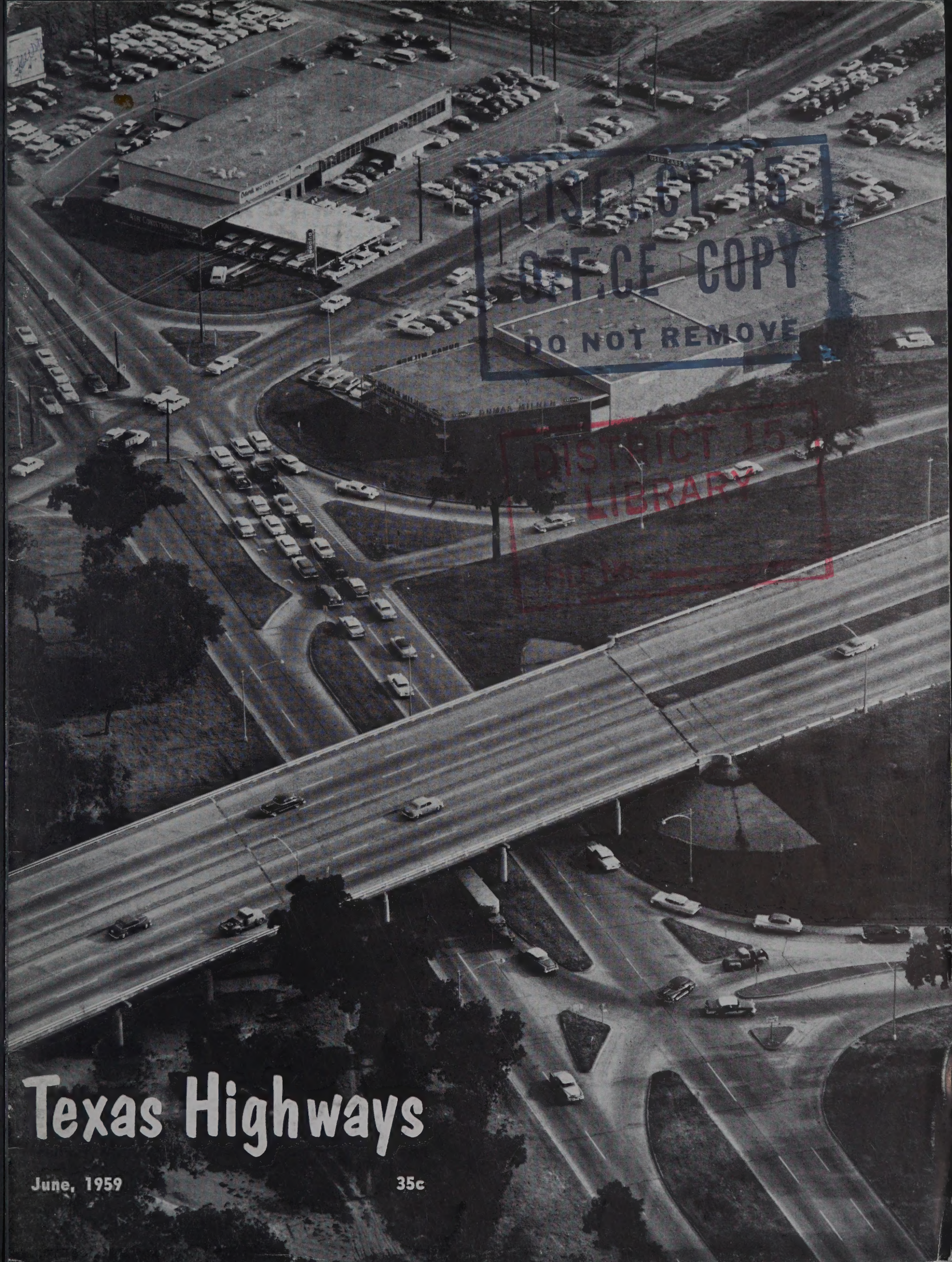
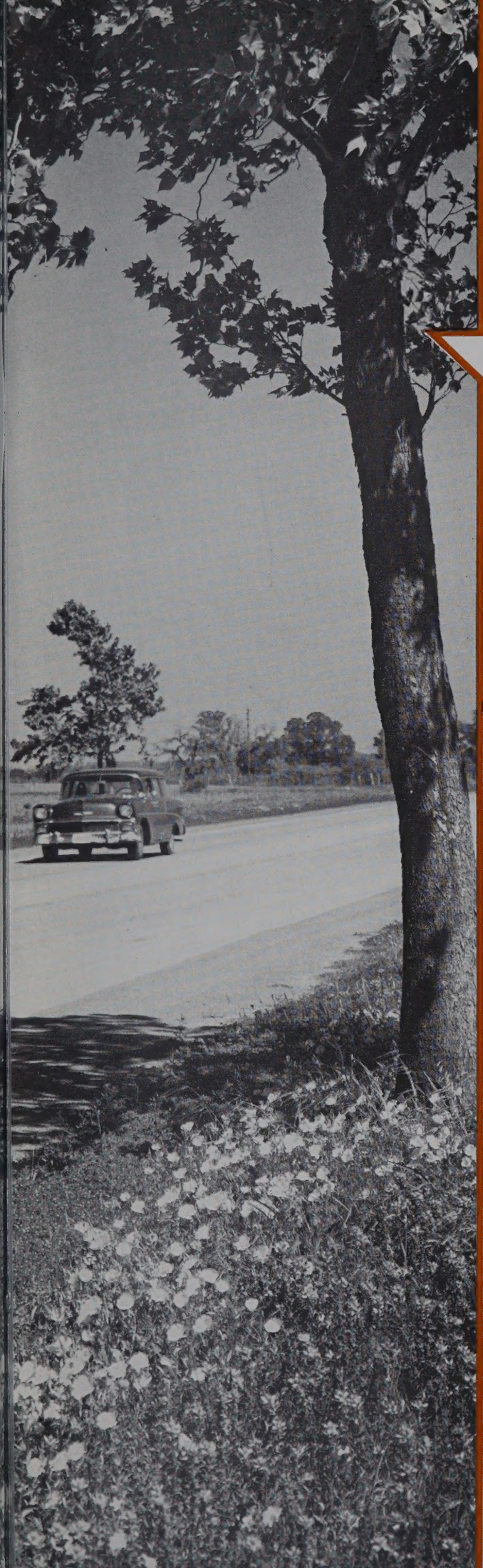


Texas Highways

June, 1959 35c



Texas Highways

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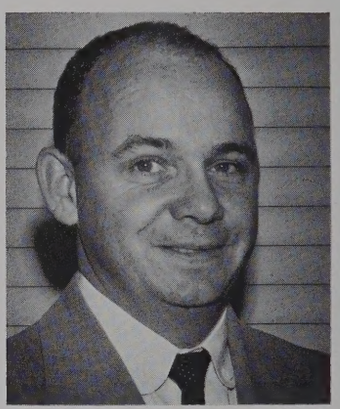
Contents

Joining Forces to Solve a Problem	2
Traffic Counting	5
Roll-In	10
The Best of Collinsworth	14
Rock Asphalt	16
Preventive Maintenance	24
Problems in Signing an Interstate Highway	25
Page Receives Medal	26
Over the Highways	27

joining forces to solve a problem

Paul R. Tutt, Senior Designing Engineer
Highway Design Division



The organization of the "Texas Highway Department-Texas Municipal League Joint Committee on Median Practices on Highway Routes on City Streets" in Austin on September 19, 1958, marked a great step in the progress of cooperation between the Highway Department and the cities of Texas in solving mutual problems.

The particular problems which this group will deal with is that of the use of medians or dividers which separate flows of traffic in opposite directions. The group is composed of six members from the Texas Highway Department and six from various cities of Texas. W. F. Frey, Urban Engineer for the Texas Highway Department, was selected as chairman; and Eugene Maier, Director of the Department of Traffic and Transportation of Houston, was named vice-chairman.

The first order of business for the committee was to study and make recommendations regarding design policies for medians on highways in urban areas. It was also felt that the scope of the committee's activities would probably broaden into other phases of Highway Department-city relations in the future. Many responsible highway and traffic engineers in the state have long recognized the need for more uniform policies in the use of medians and in their design.

Because the responsibilities for such devices rest with a number of agencies, the practices have differed throughout the state. By consolidating the thinking of this group of men it is hoped that a more uniform policy can be developed—a policy acceptable to both the State Highway Department and the cities involved.

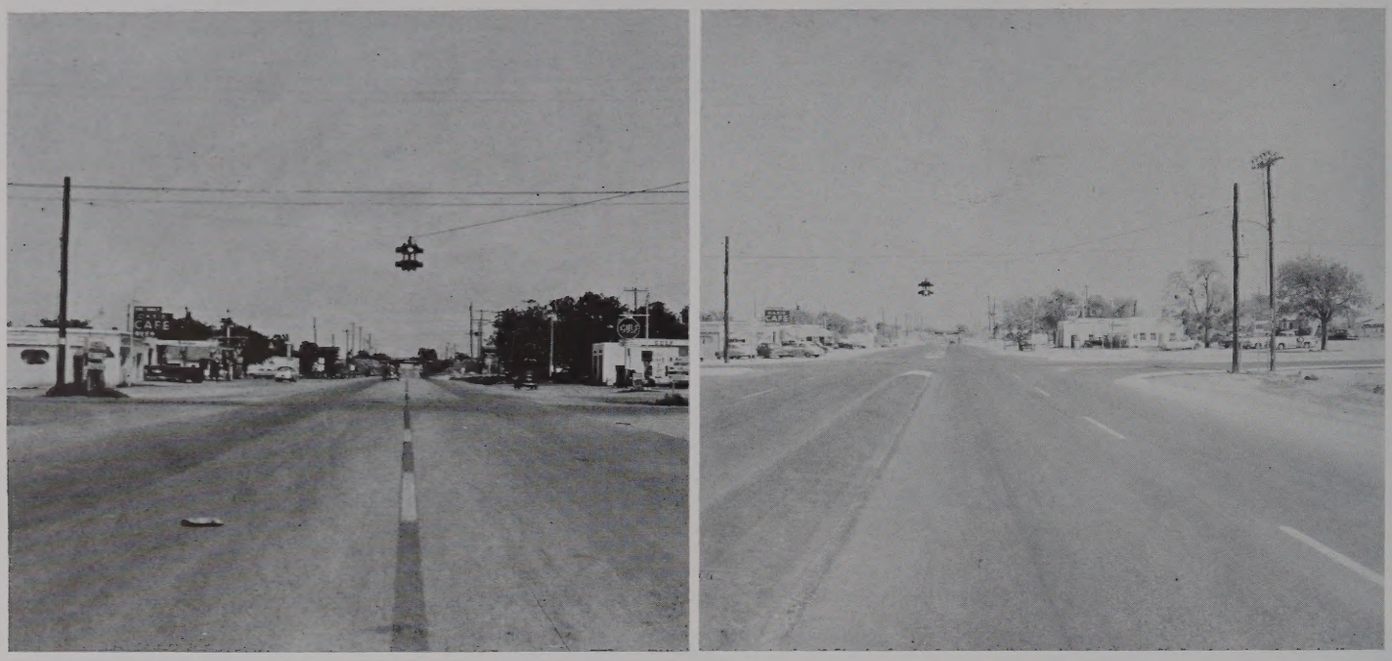
The Committee recently held its fourth meeting in Pharr. Earlier meetings were held in Austin, Houston, and Waco. Progress to date has been very encouraging. Immediately evident was a great uniformity of thought among the committee members. All evidence points to the fact that the real problem is in developing factual data to support the position of the design engineer and to publicize this data in such a manner that the parties concerned can understand it and use it advantageously.

At the present time the committee is engaged in two principal activities. The first of these is the extensive collection of data on the operation of existing medians. To accomplish this, a number of studies have been initiated. These studies include an analysis of physical and traffic conditions and an investigation of the operating characteristics of the facilities. The studies are being made by the committee members and will be assembled and analyzed by the Texas Transportation Institute at A & M College. These studies will provide a very useful background of information upon which to base future conclusions.

In addition to this, the committee has enlisted the aid of the Texas Transportation Institute to make a

These before and after pictures of a median installation in Dayton on U.S. 90 show the typical change which the construction of a new median facility causes on the main thoroughfare of a community.

limited number of detailed, or long-range, studies including physical, traffic, and economic analyses of selected study sights where medians have been or will be constructed. The first of these is already in progress in Baytown on S. H. 146. Here a project is underway to expand the present two-lane road to a multilane facility with a median. Traffic and economic studies of the "before" conditions in the area have already been completed. After the project has been in operation for a sufficient length of time to allow traffic to become accustomed to the new facility, an "after" study will be made to determine what the effect of the median has been on all phases of traffic and business activity in the area. This study is the first of several of this nature and will, in all probability, yield a great deal of comprehensive information on the subject. Portions of these studies are conducted by means of a motion picture camera located at the top of a 60-foot tower from which movies of



These views show the physical change brought about by the installation of an asphalt blister median in McGregor. A study of this location is now in progress.

The traffic conditions in Groom, Carson County, were greatly altered after installation of this sixteen-foot median which provides sufficient width for protected left-turn lanes.

the various traffic activities are taken. Analyses of these movies provide a comprehensive picture of traffic and business activities in an area.

The committee is undertaking its work in a most complete manner. It is estimated that a progress report with tentative recommendations will be finished sometime in the fall of 1959. Due to the time required to complete construction work on projects such as the Baytown study, reports on these will not be possible for about eighteen months or more.

Of major importance among the present accomplishments of the committee has been a fine spirit of cooperation among representatives of the various agencies involved. Both the Texas Municipal League and the Texas Highway Department feel that the work of this committee will be of great benefit to both agencies in the solution of common problems.

TRAFFIC COUNTING

A road-design engineer draws lines on drafting paper which will eventually be transposed into raw materials and poured as a new highway onto new miles of Texas. The number of lanes he specifies, the width of those lanes, and the materials he chooses for base and surface of the road will depend upon the number of "notches" and calculations which have previously been made for him by certain men and machines whose business is traffic counting.

Highway design is but one instance within the Department when the number of automobile and truck wheels which roll along a certain highway route is necessary information. The traffic engineer, too, wants to know. This helps him to plan and place his signs and signals.

Outside the Department, the public also has a use for this counting. Such knowledge influences real estate values, determines the locations which people choose for businesses such as filling stations, motels, and restaurants. The county judge and county commissioners use the latest figures to help determine priority for road improvements. Civic groups quote the information to assert their claims for new road projects.

Traffic counting is a helpful job, a big job. The clock around, some of the traveling men employed by Traffic Section, Planning Survey Division, are on the road making a count in person somewhere in locations east and west. At 139 permanent installations throughout the state, automatic traffic recorders are clicking off axle by axle the vehicles wheeling past, day and night. Some tell of the passage of as few as 211 per day, others chalk off as many as 81,500.

Every highway department in the nation has the job of counting traffic on its roads and has been doing this since 1936 when the Bureau of Public Roads made the Planning Survey Division a part of each state's highway department framework. Texas keeps track of vehicle volume in its own fashion, actually putting together and keeping in repair the automatic machines which have been designed within the Department to do the job.

In 1953, the Traffic Sections turned out 13,600 twenty-four-hour counts on state-maintained highways. Last year 18,480 counts were made on highways of the same category—testimony that the miles of Texas roads under state surveillance have ascended considerably in number in half-a-dozen years.

From these counts comes the information for the State Traffic Map and the District Traffic Map. Annually, Traffic Section publishes a State Traffic Map which shows the average daily traffic volumes on all highways other than farm to market roads. District Traffic Maps, also produced annually, show farm to market traffic volume in addition to volume on all other state-designated highways.

There are also the county road miles to be checked. County roads last year required 23,170 counts of 24-hour duration. Maps indicating the county traffic load are prepared every three years, showing annual average daily traffic volumes on all roads, both state and county, within each county. In a preliminary operation to determine where recorders shall be set up, counties are scouted. Heavier-volume roads, new roads, any changes in physical condition of the roads of the county which might affect the traffic pattern are determinants. One, or maybe two, hourly recording machines are installed on representative roads for the duration of the survey. These furnish control information on variations of weekday traffic and the relation of weekday traffic to week-end traffic. The permanent automatic recorders in the area will reveal seasonal data. With these two controls, annual average daily traffic can be determined for each individual road section.

The automatic traffic recorders, which number 542, are portable and are small enough that 30 or 40 units can be carried in the trunk of his car by the man who sets them in operation where a count location has been scheduled by the Austin office.

Weighing only seven and one-half pounds, the Automatic Cumulative Recorder can be set up in approximately ten minutes. It stops counting 24 hours later. Housed in a metal box which is four inches by six inches by nine and one-half inches, the machine consists of a metal diaphragm air switch which receives an air impulse

On the panel of 24 manual counters manipulated by Robert Edmondson, Junior Recorder, every vehicle passing the U.S. 183-Burnet Road Junction will be classified. Manual counts also are made at night and during all seasons. In the winter Edmondson will probably use a Coleman heater to provide warmth within his car. Counting can get uncomfortable—say, on the Gulf Coast in midsummer when the mosquitoes are flying, or in the Panhandle when snow or sandstorms beat at the parked car.

Thelton McWherter, Senior Technician, changes the film in a permanent installation. The instrument box McWherter holds consists of an eight-day clock, a counter, and a camera for recording hourly totals. The prefocused camera and a counter unit face each other. The clock, geared to the winding spool in the camera, rolls the film about one-fourth inch per hour, placing it for the next recording. As a permanent installation this machine is serviced once a week. It fits into a larger aluminum box, is bolted and secured to a concrete block on the shoulder of the road.

from each axle of a vehicle crossing the rubber tubing stretched across the roadway. Power comes from a 45-volt "B" battery inside the unit. When closed, the contact points on the air switch actuate a relay which, in turn, actuates the counter mechanism. The counter reading when set up is subtracted from the reading at the end of the 24-hour period and the total number of axles crossing the tubing is thereby revealed.

Hourly recording machines (HCM's the Traffic Section calls them) use the identical counting mechanism. On them, however, a device for filming the total count each hour has been attached. These machines are used both in permanent and temporary locations. The 35-mm. film used in hourly recording machines, when removed, is developed by Reproduction Section in Austin and delivered to Traffic Section.

The individualistic feature of the Texas Highway Department's approach to traffic counting is the fact that all its automatic traffic recorders are manufactured right in the Camp Hubbard shops in Austin. The Texas model has been the pattern adopted by at least two other states. A Department-made counter has traveled as far away as Indonesia to be copied.

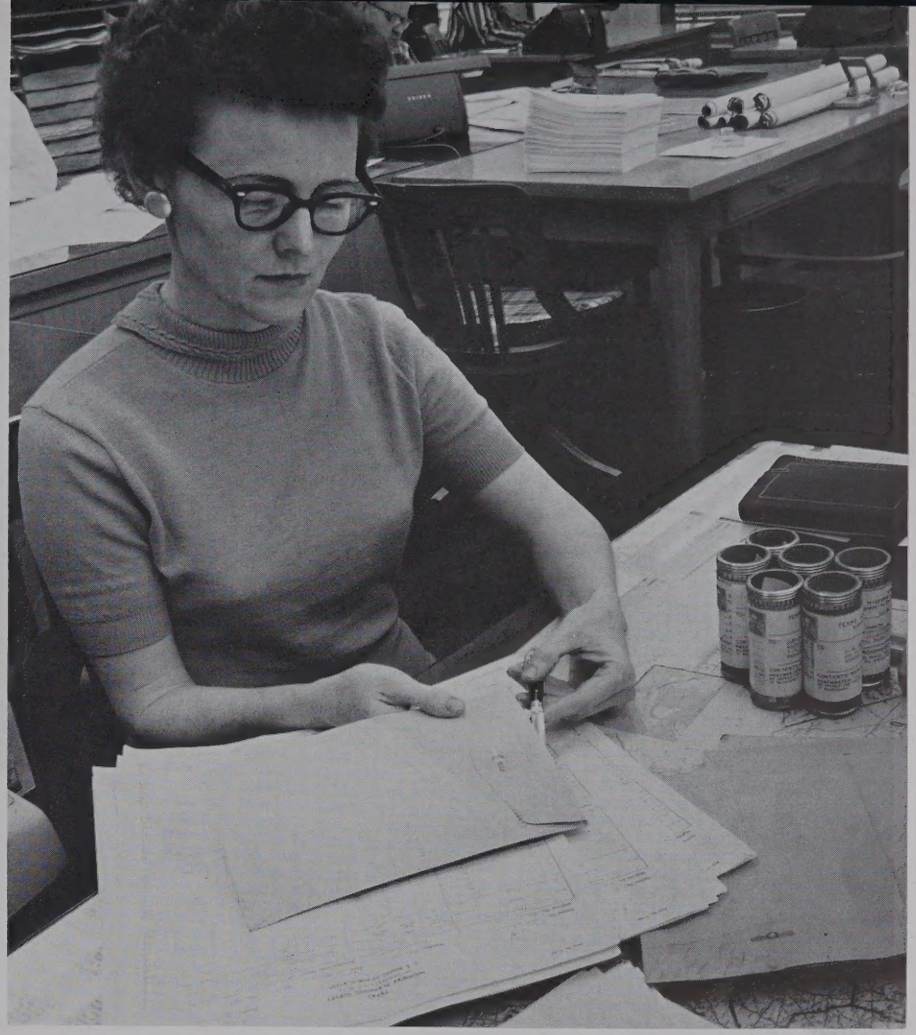
Booklets of plans and specifications for the pneumatic-type cumulative traffic recorders, both permanent and portable models, have been mailed in answer to requests from all over the world, testimony that wherever highway making is approached professionally, the traffic count is necessary.

Cost of the machines runs about like this. The automatic cumulative traffic recorder, which stops its count at the end of 24 hours, costs approximately $50 to construct. The portable hourly count machine, used in connection with semipermanent installations, costs approximately $125. Permanent installations will require approximately $150 for construction of the machine and a like sum yearly for maintenance.

Caretakers — usually maintenance foremen in the District in which the installation is located—are trained to make what minor repairs a permanent installation may need. (For more involved repairs, one of three technicians from Austin goes out on call.) So sturdy is the design of such machines, they chalk up amazing service records. In 1958 the state-wide machine average was 97.1 per cent. Expressed another way, less than three per cent of the working time the installations failed to do their job of ticking off the number of axles passing. West Texas caretakers have reported that on opening the cases which contain cameras and clocks, they sometimes find several inches of dust or sand which has sifted in from a storm, yet the mechanism is still operating efficiently.

In the steel box enclosing each permanent machine is a clothbound record book in which the repairman makes notes of services required by the machine. Film is removed and replaced, and the clock is wound each Monday by the caretaker. Of the Department's 139 permanent installations, 21 are on expressways and city streets in urban areas. The first spot ever selected for a permanent check was such an urban locale, near Arlington, 23 years ago. A unit still checks at this point.

Manual classification counts are essential, and the Texas scheme requires that a considerable number of such counts be made. To make them, Traffic Section has a group of four traveling employees operating on a predetermined schedule at 48 counting locations each month—24 on the east side of the state, 24 on the west. Once a month at each of these places, a man sets up a sign familiar to most Texans. It reads, "State Traffic Sur-



Maggie Jim Caffey, Senior Clerk, opens the day's mail in Traffic Section. Reports from the ten manual counts and twelve ACR recorder-personnel scattered in various parts of the state are destined for the traffic analysts' desks. In the cardboard tubes are rolls of undeveloped films recently removed from permanent installations. These are analyzed weekly.

Reed Baker, Traffic Manager (right), and Charles Davis, Chief Supervisor, review one of the traffic maps resulting from the counting. State Traffic Maps are priced $1. District and county traffic maps are 35 cents, and there is no charge to Departmental offices or governmental agencies.

Walter Reaves, Supervising Traffic Analyst (foreground), prepares a field schedule for stationing both men and machines. Melvin Murphy, Senior Analyst (center), and Lewis Boswell, Supervisor, are posting on County Traffic Maps the results of machine counts.

An automatic recorder comes into the shop at Camp Hubbard, Austin, for an overhaul job. Here E. W. Smith, Technician, installs a magnetic counter whose worn parts he has replaced, cleaned, and readjusted.

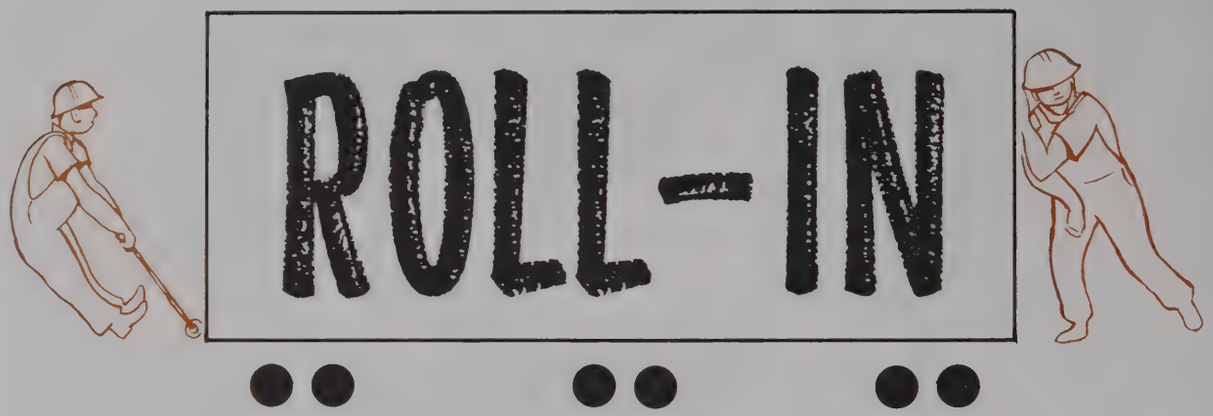
vey." Locations for the counts are selected by Traffic Section as representative of the roads in the area. Such painstaking enumerations will tell the make-up of the traffic passing a location, whereas the automatic cumulative traffic recorder will supply merely a number. In addition, six other employees make a 24-hour manual count every three months at 120 intersections of highway and farm to market roads.

To get a representative sampling, a large number of stations is required, for the traffic volume finally recorded on the maps prepared by the Section must represent a 24-hour annual average at the location, and traffic differs according to region and season. The cotton crop in the Panhandle, for example, will be harvested at an entirely different time from that in the Rio Grande Valley, and this influences the average figures arrived at when annual totals are compiled by Traffic Section.

Taking a manual count, the Departmental employee will work a full eight-hour shift, day or night, in his automobile parked on the right of way and angled so he has a view of what passes and where it's headed. A wood panel contains several rows of manual counters upon which he taps off certain combinations as each vehicle passes. Is the vehicle headed northwest and coming from the southeast a truck-trailer combination with five axles? To register this fact, two of the manual counters for five-axle combinations must be tapped. One will indicate direction of approach to the intersection, southeast, and the other, direction of exit from the intersection, northwest. A Texas passenger car or vehicles of other classification are registered in the same manner on the appropriate row of hand counters.

Results of manual classification counts come daily to the Austin office from the field. These enable the traffic analyst to convert the axle count of the nearby automatic recorder to an actual vehicle count. Such a manual count is broken down to three-, four-, and five-axle vehicles and passenger cars. From such a count an axle conversion factor is derived mathematically. This factor, applied to the axle counts registered on the automatic counting machine, will yield a vehicle count. Such factors are now varying from .43 to .49, dependent on the relative number of multiple-axle vehicles on different highways.

The work of Traffic Section is never halted, even for an hour. Somewhere in the state a machine, if not a human, is making a continuous hourly record of the vehicles that pass in the night, those that pass in the day.



To tear out one bridge and replace it with another in one working day may be peanuts when the concern is only a footbridge over an inconsequential stream. But when the same problem takes in a 198-foot-long mainline railroad bridge, the difficulties are multiplied, squared, and cubed. Employees of the Texas Highway Department played a prominent part in such an engineering feat recently in Fort Worth—the installation of a new Texas and Pacific Railway structure over what will be the final link in Fort Worth's East-West Expressway.

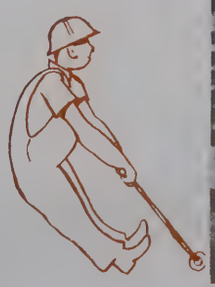
In only twelve hours, the old temporary bridge was torn out and a new one—complete with ties, tracks, and ballast—was gingerly inched into place on specially built tracks. Train schedules were scarcely interrupted.

"Rolling in" a new bridge, as this operation is called, is not uncommon in bridgework. But seldom has there been involved a structure of such length located in the heart of a busy Texas city.

A highway connection between Fort Worth's elevated expressway, now under construction, and the Dallas-Fort Worth Turnpike will pass under the $1,568,000 structure. Erection of the new bridge was a joint operation of the Texas Highway Department, the Bureau of Public Roads, and the following railway companies: Texas and Pacific; Gulf, Colorado, and Santa Fe; Colorado, Rock Island, and Pacific; Fort Worth and Denver; and Missouri-Kansas-Texas.

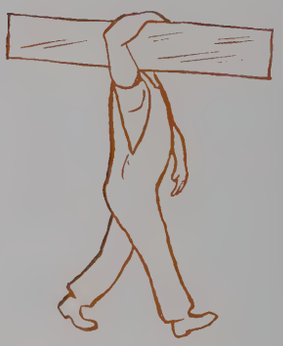
The roll-in section was built on this rolling falsework. Constructed on jacks mounted on the rail wheels, the bridge was purposely built at a higher level than needed so that it could be lowered into position upon completion of the roll-in operation.

Before the massive roll-in operation begins, the temporary trestle rests on caps on wooden piling. The new bridge is visible beyond a permanent concrete pier on which it will come to rest. Rail wheels and rail tracks will be used to move the bridge into place.



The time has come for the old bridge to be torn out. The new structure is complete with rail ties, tracks, and ballast.

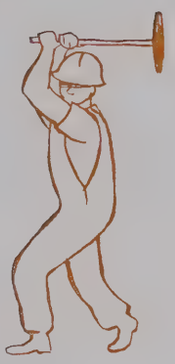
Dismantling of the old bridge begins. Cranes quickly tear out old track, ties, and temporary caps, tossing them aside to be removed from the area later.



The bridge is now completely gone as the last of the temporary caps are removed from the piling.

Inch by inch, the new bridge moves over special tracks into its new position, pulled along by truck-mounted winches. Careful control of movement prevents misalignment.

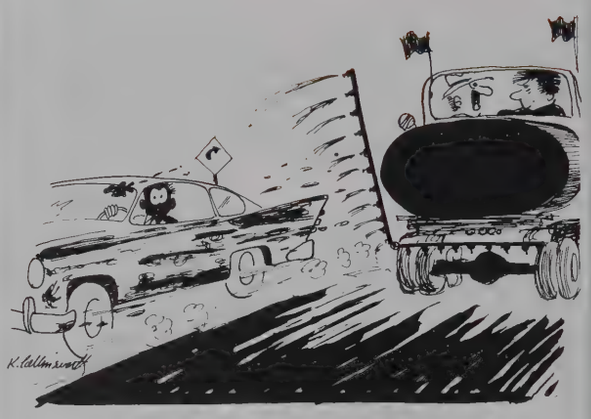
The roll-in phase of the project is almost over as the new bridge is jacked down into position and a railroad crew begins to connect the tracks. Backwalls and wing walls will be poured later. The riveted girders are tied to the piers with anchor bolts.



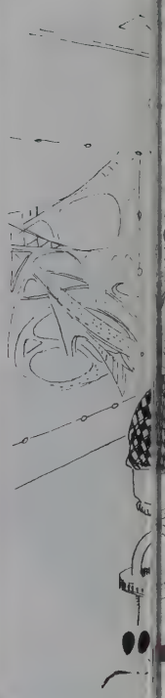
The last of the tracks are tied together and operations are resumed over the new structure with very little interruption in train schedules.

The Best of Collinsworth

"This machine is sure saving us a lot of man-power."



"Too shay."



"NOW, MR. RUGGLESWORTH THIS IS IT... OUR NEW TRANSCONTINENTAL SUPER-WAY. WHAT DO YOU THINK OF HER?"
"ITS 817 MILES TO HOOTSVILLE INSTEAD OF 816 LIKE YOUR SIGN SAYS."

"Then shall we assume, Mr. Mayor, that you aren't in favor of our new superhighway bypassing Beetleville?"

"I'm Fezby, from Faraway County... we need a couple of valve cores and by the way... have the checks come in yet?"

"Marvelous idea Fezby, hiring an assistant to listen to those guys from Austin..... saves us a lot of time!"

"Its sure good to have these highway so enthusiastic about tree pruning!"

THATS IT!"

"Now just as a courtesy, let's drop them fellers in Austin a card and let em draw us up a little plan or two.... they'll get a kick out of it, and they can't hurt anything."

ave trouble replacing Heckrott because seems to know what he did !"

"Good girl Maggie, thats better than I wrote it... you jumbled up the meaning so the Austin office can't pin us down!"

"I hate to take up the center stripe..... thats all thats holding it together!"

"I let my coffee breaks accumulate."

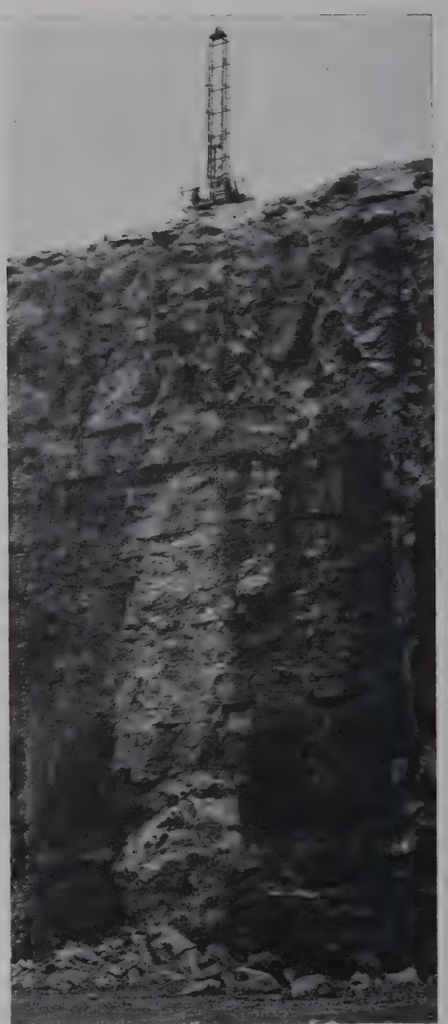
This typical rock asphalt mine stretches over hundreds of acres a few miles outside Uvalde. The gaping pit, 140 feet deep, has resulted after eleven years intensive mining. At the far end, above a sheer wall of solid rock asphalt, is the "overburden," a layer of limestone and caliche, 20 to 28 feet thick, which must be removed by blasting before the rock asphalt can be reached. This stripping operation always precedes the advancement of the pit wall. In the foreground are the tentacle-like conveyors which make plant operation almost automatic. The two nearest towers are called plants. There the rock is crushed into various sizes, transferred to stockpiles, then later returned to the same plant where an order is mixed and dumped into railroad gondola cars under the plant.

rock asphalt

One of nature's strangest products—asphalt-impregnated limestone—is used to pave highways, streets, and driveways across the land. Known as rock asphalt, this material plays a vital role in the construction and maintenance of modern highways. With this article, TEXAS HIGHWAYS continues a series devoted to widely used highway-building products and how they are produced.

AMONG THE ENDLESS rolling hills of southwest Texas, far out in a desolate land of mesquite, goats, wild pigs, and roaming cattle, there is a yawning hole. Out of it comes a highway-building material invaluable to the Texas Highway Department. Blasted from the hills by man's unending search for resources to fill his needs, that boxlike hole is 140 feet deep, 800 feet wide, and as many feet long. From it, each day, is yielded one of the rarest of natural resources—limestone impregnated with bitumen, or native asphalt. This natural product, ready and waiting to be converted to a highway-building material, is found in few places in the world. The largest known deposit of rock asphalt, as it has come to be known, is located a few miles southwest of Uvalde, in Uvalde County. There, under the uprooting jerk of dynamite and the patient scooping of mechanized shovels, this strange rock is gathered, crushed, sorted, stacked, mixed to order, and loaded on railroad cars bound for application on some distant highway job.

Although rock asphalt is widely used by the Texas Highway Department in highway construction and maintenance, its reclamation from a million years of entrapment in the earth is probably a mystery even to the men who work with it each day. Armed with a curious camera, TEXAS HIGHWAYS takes you down into one of the biggest man-made holes in Texas, up onto a man-made mountain, and into each step in the preparation of this important highway-building material.

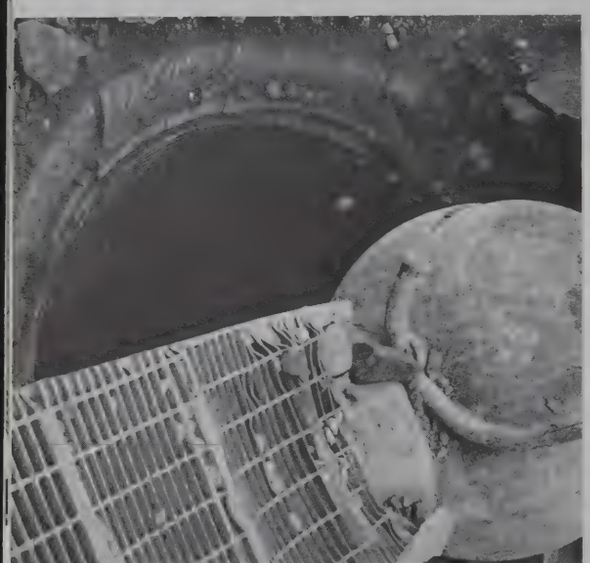


A rotary drilling machine is at work preparing holes for the next round of blasting. Holes are drilled twelve feet from the wall. In a year's operation, the wall advances some 120 feet. Here, the holes from the last blasting are evident, as are the three different strata of rock. The top stratum, 40 feet thick, averages 8 per cent bitumen; the middle 40 feet, 4 per cent; and the lower 40 feet, 8 per cent.

A warning siren blows—to be followed by an expectant silence. Suddenly, amid thundering explosives and flying rock, the carefully planned blast goes off—and 40,000 tons of the rock asphalt wall come tumbling down. The resulting muck pile will stand some 35 feet high, a safe height at which the shovels can work.

The "working" wall of the mine, dwarfing the shovels and trucks, is 120 feet high and stratified into three equal layers. The top and bottom layers of rock are rich in bitumen, the middle layer more lean. With careful blasting, the middle 40 feet of rock reacts to the explosion first, followed by the richer top and bottom layers. After the explosion, the resulting muck pile is roughly blended as to bitumen content. Mixing and proportioning begins at this stage where two shovels load dump trucks from various bitumen-percentage areas of the pile so that each truck load will average a 5 to 9 per cent bitumen content.

Diesel-powered dump trucks bring rock in all sizes from the pit to a large primary gyratory crusher, the first of many stages in preparing the rock asphalt for highway use. Drivers observe a rigid timetable which puts a load of rock into the primary crusher once every 30 seconds.



After its trip down through the primary crusher, each piece of rock asphalt is no larger than eight inches. It now begins its journey, via conveyor, up and out of the pit to the scalping tower.

The scalping phase separates the rock into various sizes and carries it on into stockpiles. Rocks which are three-fourths inch and larger are conveyed to a rubble or surge pile; everything under three-fourths inch goes into the first of two separating and mixing plants.

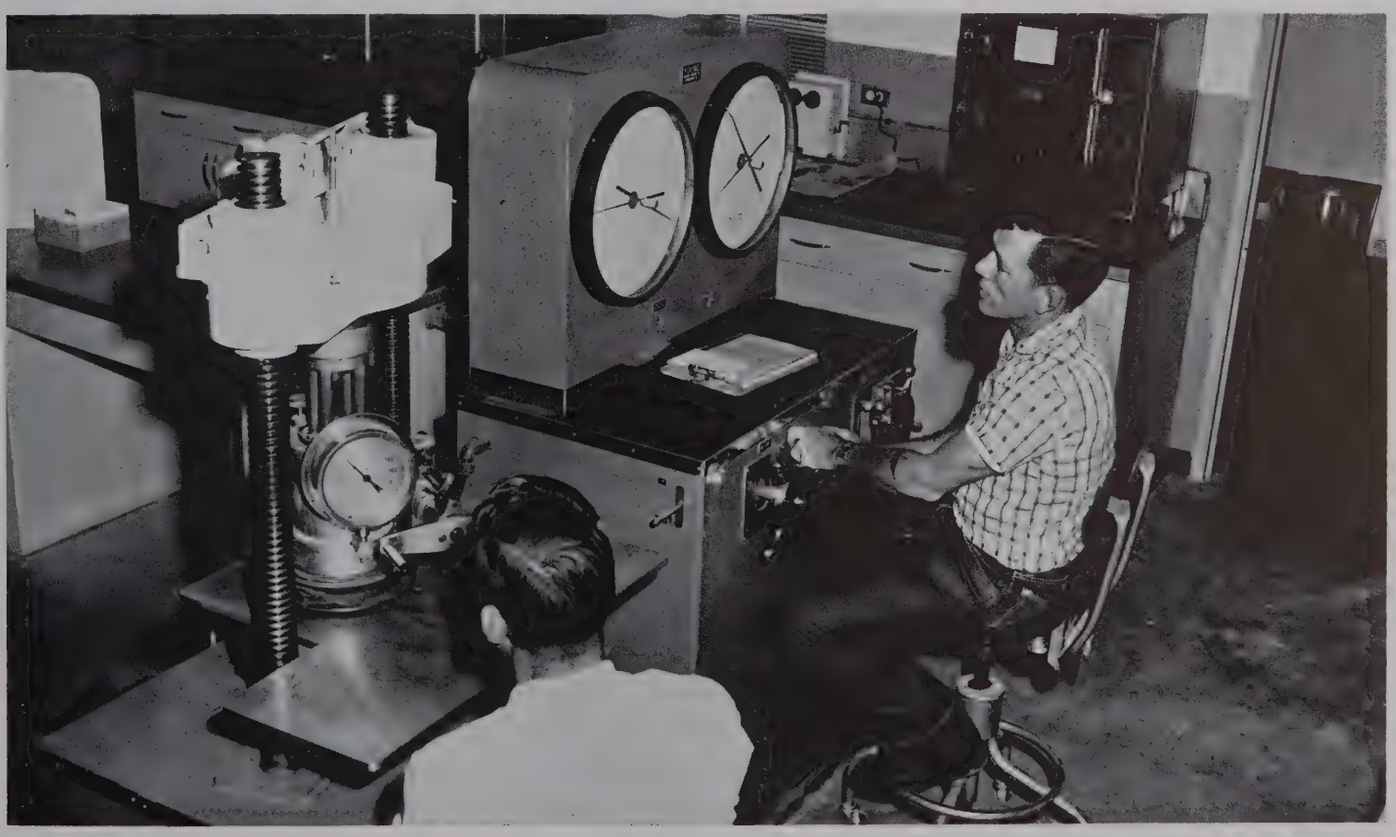
At Plant Number 1, the rock is further separated into various sizes. Material not needed for immediate order-filling is conveyed to stockpiles. Plant Number 2 operates similarly to Plant 1 except that it receives no rock directly from the primary crusher, instead processing only rock from the surge pile built up adjacent to Plant 1.

An interesting side light of rock-asphalt processing is this "dust mountain" which has collected through many years operation. This material which is produced in the manufacture of coverstone aggregate is collected and conveyed to this pile. Extremely rich in bitumen, the industry hopes eventually to find a use for this material. In the meantime, it is collected on this constantly growing mountain. Here, a plant engineer stands atop the dust mountain many feet above the surrounding terrain.

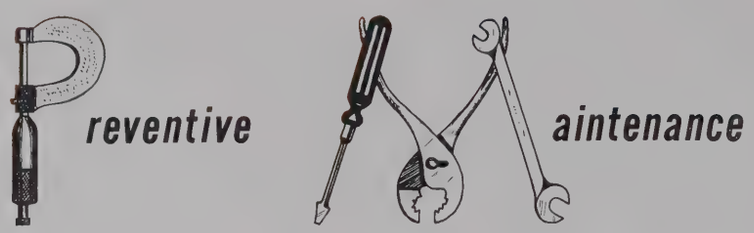
Since each processing plant serves the double function of separator and mixer, each stockpile has two conveyors which connect it with its parent plant. One conveyor delivers rock to the pile; another brings it back later for filling an order. On the left, beyond Plant 2, is a conveyor which extends down into the pile bringing rock up into the plant for final mixing to order. After being drawn back into the plant, it is mixed with from 1 to 3½ per cent of a specially prepared fluxing oil, depending on the product ordered. This fluxing is made effective by the addition of from 1 to 2 per cent water. The plant can produce a number of different products such as premix, black base, asphalt rock, dry cover stone, and precoated cover stone. The finished mixture is dumped immediately into railroad gondola cars which soon leave the plant destined for highway and street projects all over the state.

Rock asphalt is the product of eons of natural processes. In a geologic formation which would have otherwise become a rich oil field, a past volcanic intrusion raised the land, boiled off the crude petroleum, leaving only asphalt impregnated in the limestone. This natural process is similar to present-day petroleum refinery operation, since asphalt is the last product to be cracked from crude oil. A close view of a piece of rock asphalt shows the limestone has millions of tiny asphalt deposits. When heated, the rock will display bubbling asphalt and give off the characteristic asphaltic odor. The bitumen impregnation of the limestone rock is what makes rock asphalt valuable as a paving material. On the job, the rock is laid down by conventional highway equipment commonly used for laying asphaltic concrete pavement. When set, it will form a thick sheet of solid rock of high stability and durability, yet will have resiliency and smoothness.

Located a few miles from the mine is a staff and laboratory maintained by Materials and Tests Division which conducts tests on each carload of rock asphalt to see that the load meets Highway Department specifications. Clifford Hicks, Junior Inspector (foreground); and Bill Brice, Senior Inspector, measure the stability of a rock-asphalt, premixed-pavement mixture prior to its shipment.



"Quarter of a Million Dollar Goal"



The saving ways of seven Districts were focused in the eye of a movie camera recently, and the first Highway Department audiences of equipment and procurement personnel are already viewing the ideas the film suggests.

"Quarter of a Million Dollar Goal" is the title of the film which will be shown in every District within the year. This title is meaningful to Equipment and Procurement Division, which has set for itself that amount as this year's total savings on tires. Recapping, underinflation, overload, rotation, and dual-mating of tires are some of the points illustrated in the movie by the men and machines of Districts 1, 2, 7, 9, 10, 14, and 23.

Three reels and 1,000-feet long, the 16 mm. color-sound movie is enacted from script written by Jim Spires, Equipment Analyst, of the Austin office of D-4. Bob Bradley, Senior Draftsman, of Maintenance Operations Division in Austin, was photographer. Spires, who also narrates the script, will take the film to meetings in every District, where it will be used to urge the subject of preventive maintenance. "P-M," as Equipment and Procurement Division refers to the practice of economy and conservation, is largely a matter of the exchange of know-how, traveling ambassador Spires says.

This venture into visual education is the first in a projected series of idea-swapping films. The Division hopes in this way to illustrate to the Districts what each can do in the interest of practical economy. As the year progresses, additional short-subject films are planned on such subjects as mounting and dismounting of tubeless truck tires, wheel balancing and wheel alignment, and correction of mechanical irregularities.

Preventive maintenance practices by which seven districts are saving tire money were filmed by the two-man team pictured here. The resulting movie entitled, "Quarter of a Million Dollar Goal," will be shown at preventive maintenance meetings in all the districts by Jim Spires (right), Equipment Analyst, who wrote the script. Robert Bradley, Senior Draftsman, was photographer. The pair from the Austin office were photographed while editing the film.

Problems
*in Signing an Interstate Highway**

Jerry Nemec, Senior Resident Engineer
District 17

This part of the discussion concerns the problems incurred by a Resident Engineer during the planning stage of an Interstate signing project. When we were assigned the job of signing a project, our previous experience in the Residency consisted of reading signs while driving along a strange highway.

Therefore, in our case, and I am sure there will be others who will find this true, the number-one problem that confronts the Resident Engineer is the lack of knowledge concerning uniform signing. This called for some fast research which brought out some excellent booklets and papers by people who have made traffic engineering their specialty.

The following booklets and items are a must and should be studied carefully before attempting to sign a project.

1. "Manual on Uniform Traffic Control Devices"—prepared by Joint Committee of AASHO.
2. "Signing and Pavement Marking of the National System of Interstate and Defense Highways" — adopted by AASHO and approved by the Bureau of Public Roads.
3. "Texas Manual on Uniform Traffic Control Devices"—prepared by D-18.
4. "Comments on Signing and Delineation Plans for Interstate and Other Controlled Access Highways"—prepared by D-18.
5. Sample Plans and Specifications made up by D-18.
6. "Sign Layout Guide" by Minnesota Mining and Manufacturing Company, and "Sign Design Standards" by AGA.

The comments on signing, the plans and specifications as published by D-18 are very good, brief and to-the-point, and will give you an excellent idea of the job before you.

These two booklets are published by the manufacturers of reflectorized signs and will give you considerable help in determining the size of a given sign.

After a study has been made of this available information, the Resident Engineer is in a position to start the plans; and, therefore, he is confronted with new problems—mainly the fact that you cannot do everything by the book.

Our signing project takes in a section of Interstate Highway 15 here in District 17, Walker County, and consists of that section of Interstate Highway 45 which loops the town of Huntsville. This section of highway is classified as rural and is seven miles long. It intersects one state highway, one farm-to-market highway, connects with the Huntsville business route on each end, and has four complete interchanges. Two-way frontage roads parallel the entire length of the project.

One of the problems that we were confronted with was the spacing of signs between interchanges. The AASHO policy on entrance ramps states that an Interstate route marker is to be placed 500 feet past the end of the acceleration lanes; thence 1,000 feet farther, a speed-limit sign; thence 1,000 feet farther, a designation sign. On the other hand, the policy states that exits are to have an advance warning sign at a sufficient distance to allow drivers to get into the right lane; thence an exit sign at the beginning of deceleration lanes. We felt that our advance warning should be at least one-half mile in front of the exit sign. In trying to carry these policies out, in our case, we found that there was an overlap of entrance signing and exit signing. We approached D-18 with this problem, and with its approval we eliminated the designation sign, thereby giving us the necessary room and not necessarily inconveniencing the motorist, because one designation sign, placed at each end of the loop, will give him the necessary information.

Another problem that arose concerned the route marker. The AASHO policy places the Interstate route marker on the left whenever it is placed on a "T" mount with a federal or state marker. This creates a problem in many instances. Under certain conditions, the directional arrows point toward each other or across each other. This not only looks peculiar but might also tend to confuse the motorist. It would be difficult to explain the methods of correcting this problem, because each condition will require a different solution. In most cases we found that the addition of a marker and mount just ahead of the turn off and one past the turn off eliminated this condition.

Another problem that may arise is the problem of determining proper

***Speech presented at the Thirty-third Annual Short Course.**

guide signs on crossroads at interchanges. In the north direction from Huntsville, on Interstate Highway 45, we have several towns of interest and also in the southerly direction we have several towns of interest. This brings up the problem as to which destination should be signed. To avoid placing so many guide signs as to be confusing, it becomes necessary to determine the destination of greatest interest and sign for it. We decided that in our case, Dallas, 170 miles north, and Houston, 70 miles south, should be the destinations to sign for, and we signed accordingly.

Another problem that we were confronted with was the signing of two-way frontage roads at interchanges. As one can readily see there are numerous movements possible. Now the problem arises as to how much signing is necessary. In our rural section it was decided that we would sign for the normal movements of the traffic, that is, for traffic making an entrance or exit from either southbound or northbound lanes. The remaining movements will mostly be made by local traffic; and, therefore, it is felt that they will not be inconvenienced in any way.

And, of course, in some cases the size of the guide signs creates a problem. In places where it is necessary to place a guide sign and the room between shoulders is limited, there is a problem of the sign overhanging the roadway. As you probably know, with the AASHO policy on size of letters and numbers, it takes some good-size signs for some of the towns with long names. In such case the signs must be placed at sufficient height to clear high loads.

With two-way frontage roads the signing of the exits also becomes a problem. We had to determine whether to stop traffic on the frontage roads and let the exit traffic have the right of way or whether to stop the exit traffic and give the frontage roads the right of way. In either case, we felt that there would be some unsatisfactory conditions. We took our problem to D-18, and after some discussion it was decided to use the "Yield Right Of Way" sign on the exit traffic.

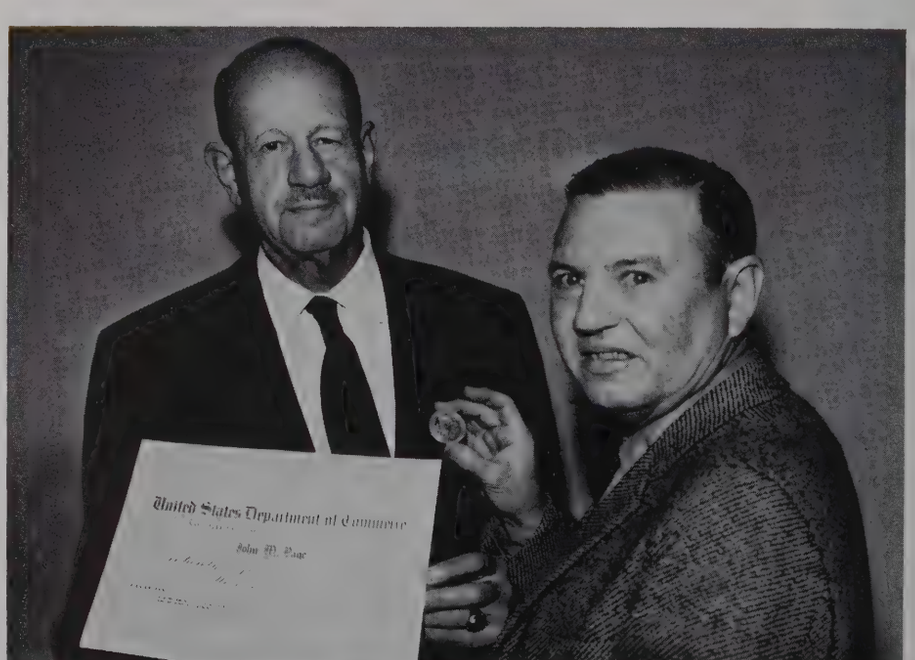
Although this report has touched only a few problems that may arise, it is felt that they are some of the most important ones; however, in closing I would like to point out one last problem that might be of some interest. That is the problem of determining whether one has a "major" or "other-than-major" interchange. The policy states that eighteen-inch letters are to be used on advance signs for major interchanges and twelve-inch on advance signs for interchanges other than major. Although everyone has a concept of what a major or minor interchange is, it seems that no one has drawn a definite line between the two. Therefore, in one case we still are trying to determine whether we have a major or minor interchange.

Page Receives Medal

On March 31, in the Texas Division Office of the Bureau of Public Roads in Austin, Division Engineer John M. Page was presented the Department of Commerce Meritorious Service Silver Medal Award. This award, presented for service of unusual value to the Bureau, was handed to Page by R. C. Taylor, Regional Engineer of the Bureau's office in Fort Worth.

Page received the citation in recognition of his many years of noteworthy leadership and outstanding ability in the field of highway engineering and administration and for exemplary public service.

Attending the ceremony were Mrs. Page, State Highway Engineer D. C. Greer, Assistant State Highway Engineer J. C. Dingwall, other officials of the Texas Highway Department, and employees of the Austin office of the Bureau of Public Roads.



John M. Page, Division Engineer of Texas, Bureau of Public Roads, receives the Department of Commerce Meritorious Service Silver Medal from A. C. Taylor, Regional Engineer, Bureau of Public Roads.

OVER THE HIGHWAYS

Comments . . . from the Traveling Public

We disliked nothing but the way you make hot tea. Water should be boiling. The food is wonderful but the portions too large.

Winnipeg, Manitoba

We dislike the roads. Fort Worth is a very unclean town . . . disliked the scenery. . . . We liked nothing except the gas prices.

(unsigned)

◈ *We can't please them all.*

We liked and appreciated the friendly and courteous help we got from the attendant at the information bureau. We liked the cities, the friendliness of all the people we came in contact with and the generosity they showed. The cities were clean . . . and the roads the best we have been on in any state. We were glad they were so well marked, too.

Mr. and Mrs. Claude Rogers
Huntington, Indiana

◈ *Well, that's more like it.*

I compliment you on your outstanding highways throughout the State of Texas. I recently completed a trip to San Antonio, Corpus Christi and Laredo and have never traveled on such wide, extensive highways.

Enabling slower cars to pull over, the asphalt shoulders make passing easy and safe. I particularly liked the stretch of highway from Dallas to Corpus Christi. Directions, speed limits, and mileage were often and accurately posted.

The State of Texas should be proud of their highways and I sincerely wish you continued success in keeping them in excellent condition.

Henry P. McHale
Kansas City, Missouri

We liked Inner State Highway Ten.

(unsigned)

This letter is in thanks for the assistance I received from the crews of trucks number 3750E and 3125F near Kent, Texas, during the recent ice storm. I was pulling a large trailer behind my car over ice-covered U. S. 80 and slid into the ditch and the crews of the aforementioned trucks gave me much assistance.

My thanks for a great team—the highway maintenance crews of the Texas highways.

W. M. Brooks
Denison, Texas

We got stopped by State Police south of Houston 100 miles per hour. Road too good I guess. Just a warning. No ticket. . . .

(unsigned)

On January 29, I had a flat tire in the front of your building on U. S. 181 South and Loop 13 here in San Antonio.

There were no service stations for at least a mile and I was at a loss to know what to do. One of your employees, Mr. Dwayne Herold, was kind enough to use his personal equipment and time to fix the flat for me and would accept no pay.

I just wanted to express my sincere appreciation and let you know what a courteous and considerate employee you have in this office.

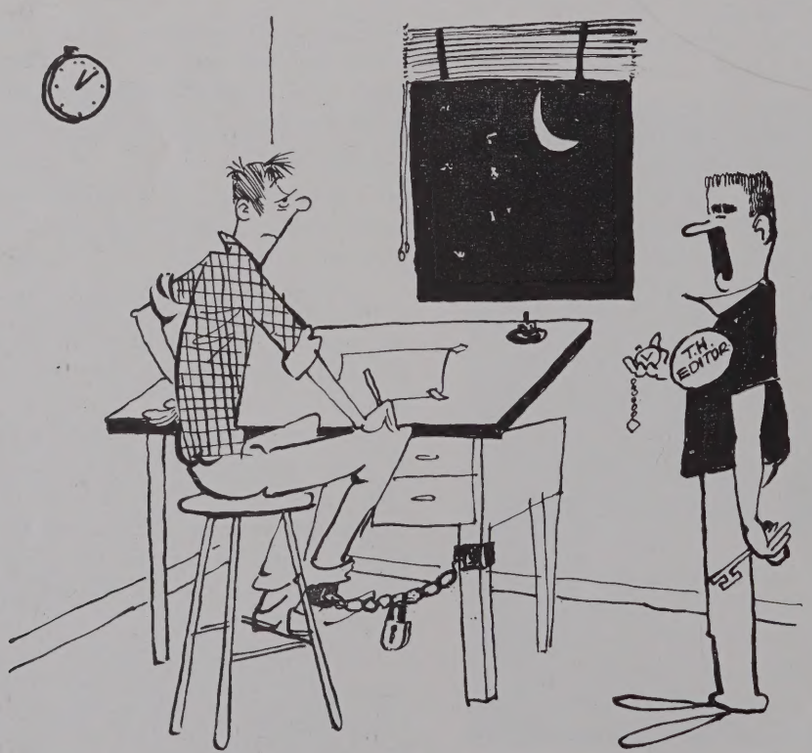
Henry Hoff
San Antonio, Texas

To and From Our Readers

Ken Collinsworth has been tickling the Highway Department funnybone via cartoons in TEXAS HIGHWAYS and the HIGHWAY NEWS since 1950. His talent with pen, ink, and a punch line has brought chuckles and comment from every corner of the world where these publications are circulated. Since he first joined the Department in 1949 after graduation from Texas A&M with a degree in landscape architecture, Collinsworth has turned out over 200 cartoons. Through the years they have made almost legendary the onery "Super Highway Engineer" and downtrodden "Fezby."

As a Senior Landscape Advisor with D-18, Collinsworth spends much of his time in the Bryan, Waco, and Wichita Falls Districts formulating plans for roadside and site developments.

This month, TEXAS HIGHWAYS tips a grateful hat to Ken Collinsworth for his contribution during the last nine years. However, to offset any idea that he is employed by the Department as a cartoonist, he hastens to assure that the cartoons (two per month) require a maximum of 45 minutes creation time each. As far as his readers are concerned, it is a well-invested 45 minutes.



"TO HECK WITH LANDSCAPE PLANS...THAT CARTOON FOR 'TEXAS HIGHWAYS' HAS TO BE FINISHED!"

About the Cover . . .

This aerial shot looks down on modern Interstate Highway 35 (U.S. 81) in Fort Worth. Through traffic can speed on its way, unhampered by 5 o'clock traffic homeward bound within the city.

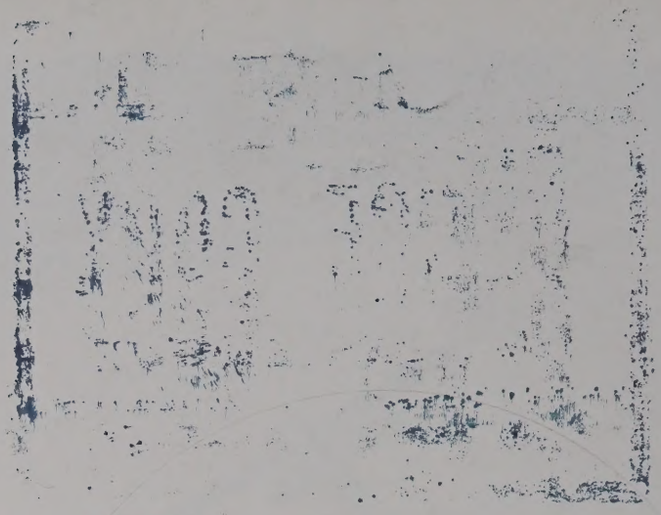
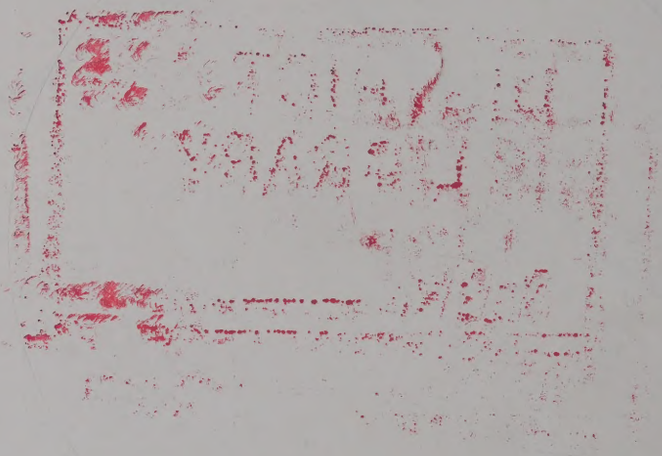
Inside the front cover we picture a scene on State Highway 71 between Smithville and La Grange. A hot summer sun beats down with little sign of a breeze stirring the buttercups forming a border along the highway.

As our photographer drove over Texas highways he came upon this ingenious barricade pictured at right. Whether a result of a shortage of barricades or spur-of-the-moment action, it is definitely an eyecatcher. Our photographer hastened to add that the impromptu barricade was *not* placed by highway forces.

TEXAS HIGHWAY COMMISSION

HERBERT C. PETRY JR.	Chairman
CHARLES F. HAWN	Member
HAL WOODWARD	Member
D. C. GREER	State Highway Engineer

Texas Highways

TEXAS HIGHWAYS, official journal of the Texas Highway Department, is published in the interest of highway development in Texas and for departmental education in the improvement of construction, maintenance, and operation.

TEXAS HIGHWAYS is available to the general public on a subscription basis at $3.50 annually, or it can be purchased for 35 cents a copy. Subscriptions, inquiries, material, or manuscripts should be directed to the Editorial Office, Division of Information and Statistics, Texas Highway Department, Austin 14, Texas.